

RECREATIONAL TRAIL AND WALKWAY CONSTRUCTION SPECIFICATION

1. SCOPE

The work shall consist of furnishing materials and installing all components of the recreational trail and walkway as outlined in this specification and the drawings.

2. MATERIALS

All materials used shall conform to the quality and grade noted on the plans, set forth in Section 9, or as otherwise listed below:

PORTLAND CEMENT shall be Type II or IIA and conform to ASTM-C150, unless otherwise set forth in Section 9. If Type II is used, an air-entrainment agent shall be used.

CONCRETE AGGREGATE shall meet the requirements and gradation specified in ASTM-C33. Coarse aggregate shall meet the gradation for size numbers 57 or 67.

WATER used in mixing or curing concrete shall be clean and free from injurious amounts of oil, acid, salt, organic matter or other deleterious substances.

REINFORCEMENT BARS shall be grade 40 or higher, and shall conform to ASTM-A615, A616, or A617. Welded wire fabric reinforcement shall conform to ASTM-A185 or A497. Reinforcement shall be free from loose rust, oil, grease, curing compound, paint or other deleterious coatings.

CONCRETE ADMIXTURES shall conform to ASTM-C260 for air-entrainment, and ASTM-C494, type A, D, F or G, for water-reduction and set-retardation, and type C or E for non-corrosive accelerators.

POZZOLAN shall conform to ASTM-C618.

CURING COMPOUND shall meet the requirements of ASTM-C309, Type 2, Class A or B, or as otherwise required in Section 9.

MASONRY COMPONENTS shall meet the requirements of ASTM-C90 & C270, and be placed in accordance with ACI-530.

PRECAST CONCRETE units shall comply with ACI-525 and 533.

PREFORMED EXPANSION JOINT FILLER shall conform to the requirements of ASTM-D1752, Type I, II, or III, unless bituminous type is specified, in which case it shall conform to ASTM-D994 or D1751.

JOINT SEALERS shall conform to the requirements for ASTM-C920, Federal Specification SS-S-210A, or Federal Specification TT-S-227, as appropriate for the specific application.

WATERSTOPS. Vinyl-chloride polymer types shall be tested in accordance with Federal Test Method Standard No. 601, and shall show no sign of web failure due to brittleness at a temperature of -35 degrees Fahrenheit. Colloidal (bentonite) waterstops shall be at least 75 percent bentonite in accordance with Federal Specification SS-S-210A. Non-colloidal waterstops shall only be used if approved by the Engineer.

AGGREGATES. Aggregates shall meet the requirements of PennDOT Pub. 408, Section 703, for the gradations specified in the drawings or Section 9, or as otherwise set forth in Section 7 and/or 8c.

BITUMINOUS CONCRETE. Bituminous concrete shall meet the requirements of PennDOT Pub. 408, Sections 401, 420 and 421, for the course(s) specified in the drawing or Section 9, or as otherwise set forth in Section 8b.

WOOD shall be graded and stamped by an agency accredited by the American Lumber Standards Committee as meeting the required species, grade, and moisture content. In the absence of such a stamp, the Contractor or material supplier shall provide written

certification that the wood products meet the designated quality criteria.

PRESSURE TREATED WOOD PRODUCTS shall be Douglas Fir, Southern Yellow Pine, or as otherwise specified on the drawings or in Section 9. They shall be treated with preservatives in accordance with the American Wood Preservers Association (AWPA) Commodities Standard for the intended use. Each piece shall bear the AWPA stamp of quality. In the absence of such a stamp, the Contractor or material supplier shall provide written certification that the pressure treated wood meets the designated quality criteria.

FASTENERS for wood structures shall be stainless steel, galvanized, or otherwise protected from corrosion due to contact with moisture and special wood preservatives

GEOTEXTILES. Geotextiles shall meet the requirements of PennDOT Pub. 408, Section 735, for the Type and Class specified in the drawings or Section 9, or as otherwise set forth in Section 5.

ORGANIC SURFACES. Materials such as tanbark and saw dust shall be free of contaminants and rot.

3. CLEARING AND GRUBBING

All trees, brush and rubbish shall be cleared and grubbed within the area to be protected, including any appurtenances, and borrow areas. All material removed by clearing and excavation operations shall be disposed of as directed by the Owner or his/her Representative. Sufficient topsoil is to be stockpiled in a convenient location for use on disturbed areas to facilitate seeding.

All trees, shrubs, and fallen timber shall be removed for a distance of two feet on each side of the trail edge, except that a distance of one foot on each edge will suffice for footpaths. Stumps shall be cut close to the ground. All protruding limbs shall be removed for a distance of four feet each side of the trail centerline and to a height of eight feet on foot paths and to 10 feet if other than foot traffic is expected.

4. FOUNDATION PREPARATION

All base course material shall be set on undisturbed soil or non-yielding compacted material. Geosynthetics may be used, if approved by the Engineer, to further separate and/or stabilize the foundation. Over-excavation must be corrected as noted on the drawings or as directed by the Engineer or his/her designated Representative.

Surface and subsurface drainage systems shall be installed and operating adequately to remove water from the foundation to allow for proper placement of base and surface materials.

Drainfill upon which concrete is to be placed shall be covered with a geosynthetic which has an AOS between 20 and 100, inclusive.

5. DRAINAGE STRUCTURES

Culverts, subsurface drains, and swales shall be installed as shown on the drawings. Surface and subsurface drainage structures shall be adequately removing water from the foundation to allow for proper placement of base and surface materials.

6. GEOTEXTILE

Where specified in Section 9 or on the drawings, geotextile shall be installed on the prepared subgrade. The geotextile shall be placed, overlapped and anchored as recommended by the manufacturer, unless otherwise specified in Section 9 or on the drawings.

Vehicles and heavy equipment shall not be operated directly on top of the geotextile. Base course or surface material shall be placed on the geotextile ahead of the construction equipment.

7. BASE COURSE

The base course shall be placed on the area to the grades and thicknesses shown on the plans. The base material shall be as set forth in Section 9 and/or as shown on the drawings. The material shall be wetted and compacted by

rollers or other construction equipment approve by the Engineer.

8. SURFACE TREATMENTS

a. Portland Cement Concrete

Concrete Mix

Concrete for structures shall have a 28-day compressive strength of at least 4000 psi, unless otherwise specified on the drawings or in Section 9. The Contractor shall be responsible for the design of the mix and certification of the necessary compressive strength. Current certification of the design mix by Penn DOT may be accepted in lieu of additional testing.

The slump shall be three to six inches (without superplasticizers); the air content by volume shall be five to seven percent of the volume of the concrete. Admixtures such as superplasticizers, water-reducers and set-retarders may be used provided they are approved by the Engineer prior to concrete placement and are used in accordance with the manufacturer's recommendations.

Superplasticizers may be added to concrete that has a 2 to 4 inch slump (before addition of the admixture), will not be dropped more than 12 feet, and is not warmer than 95° F. The slump shall not exceed 7½ inches with the addition of the superplasticizer.

Mixing and Handling Concrete

In general, concrete shall be transported, placed, and consolidated in accordance with ACI-304, of which some specific interpretations are set forth below.

A batch ticket shall be provided to the Owner or Technician by the supplier for each load of concrete delivered to the site. The batch ticket shall state the class of concrete, any admixtures used, time out, and the amount of water that can be added at the site and still be within the design mix limits.

Concrete shall be uniform and thoroughly mixed when delivered to the job site. The Contractor shall test slump and air entrainment as

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necessary to insure that the concrete meets the requirements of this specification. Variations in slump of more than one inch within a batch will be considered evidence of inadequate mixing and shall be corrected or rejected. No water in excess of the amount called for by the job design mix shall be added to the concrete.

For concrete mixed at the site, the mixing time after all cement, aggregates and water are in the mixer drum shall be at least 1-1/2 minutes.

Concrete shall not be placed until the base course and steel reinforcements have been inspected and approved by the Engineer or his/her designated Representative. Notification shall be given far enough in advance to provide time for the inspection. Prior to placement of concrete, the subgrade shall be free of chips, sawdust, debris, standing water, ice, snow, extraneous oil, mortar or other harmful substances or coatings. Placement of concrete on frozen subgrade will not be permitted.

Concrete shall be placed as rapidly as practical by methods that will prevent segregation of the aggregates or loss of mortar. Concrete shall be placed within 1-1/2 hours after the introduction of cement to the aggregate unless an approved set-retarding admixture is used in the mix. During periods of hot weather, it may be necessary to reduce this time.

Immediately after placement, concrete shall be consolidated by spading and vibrating, or spading and hand tamping. It shall be worked into corners, and around all reinforcement and embedded items in a manner which prevents segregation or in the formation of "honeycomb." Excessive vibration which results in segregation of materials will not be allowed. Vibration must not be used to make concrete flow in forms, slabs, or conveying equipment.

Slab concrete shall be placed at the design thickness in one layer. If placing is discontinued prior to completion of the entire slab, the unfinished end of the concrete shall be formed to a vertical surface, to create a proper construction or expansion/contraction joint. Construction joints (vertical) shall be made by cleaning the hardened concrete surface to exposed aggregate by sandblasting, air/water

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jetting, or hand scrubbing with wire brush, and keeping the concrete surface moist for at least one hour prior to placement of new concrete.

Concrete surfaces do not require extensive finishing work; however, the surface shall be smooth and even. Careful screeding (striking-off) and/or wood float finishing shall be required, unless otherwise shown on the drawings or set forth in Section 9. Exposed edges should be chamfered, either with form molding or molding tools. The addition of dry cement or water to the surface of screeded concrete to expedite finishing is not allowed.

Any additional desired finishing of the surface (such as grooving for improved animal footing) shall be accomplished after an initial stiffening of the concrete has taken place.

Reinforcing Steel Placement

Reinforcement shall be accurately placed and secured in position in a manner that will prevent its displacement during the placement of concrete. In slabs, steel shall be supported by precast concrete bricks (not clay bricks), or metal or plastic chairs. Except for dowel rods, placing steel reinforcement into concrete already in place shall not be permitted.

Splices of reinforcing steel shall be made only at the locations shown on the drawings, unless otherwise approved by the Engineer. Unless otherwise required, welded wire fabric shall be spliced by overlapping sections at least one full mesh dimension plus two inches. All reinforcement splices shall be in accordance with ACI 318.

Reinforcing steel shall not be welded, unless approved by the Designer. The ends of all reinforcing steel shall be covered with at least 1-1/2 inches of concrete.

Curing

Concrete shall be prevented from drying for at least seven days after it is placed. Exposed surfaces shall be kept continuously moist during this period by covering with moistened canvas, burlap, straw, sand or other approved material unless they are sprayed with a curing

compound. Concrete, except at construction joints, may be coated with a curing compound in lieu of continuous application of moisture. The compound shall be sprayed on moist concrete surfaces as soon as free water has disappeared but shall not be applied to any surface until patching, repairs and finishing of that surface are completed. Concrete shall be wet cured or remain in forms until immediately before patching, repairs, or finishing is performed. Curing compound shall not be allowed on any rebars.

Curing compound shall be applied in a uniform layer over all surfaces requiring protection at a rate of not less than one gallon per 150 square feet of surface. Surfaces subjected to heavy rainfall or running water within three hours after the curing compound has been applied, or otherwise damaged, shall be resprayed.

Any construction activity which disturbs the curing material shall be avoided during the curing period. If the curing material is subsequently disturbed, it shall be reapplied immediately. Vehicles, overlying structures, or other heavy loads shall not be placed on new concrete slabs for at least three days, unless the concrete strength can be shown to be adequate to support such loads.

Concreting in Cold Weather

Concreting in cold weather shall be performed in accordance with ACI 306R-88. In addition, the contractor shall provide a written plan at least 24 hours in advance of placing concrete in cold weather, and shall have the necessary equipment and materials on the job site before the placement begins.

Concreting in Hot Weather

Concreting in hot weather shall be performed in accordance with ACI 305R-99, of which some specific interpretations are set forth below.

The supplier shall apply effective means to maintain the temperature of concrete below 90 degrees Fahrenheit during mixing and conveying. Exposed surfaces shall be continuously moistened by means of fog spray or otherwise protected from drying during the

time between placement and finishing and during curing. Concrete with a temperature above 90 degrees Fahrenheit shall not be placed.

b. Bituminous Concrete

Bituminous concrete shall be installed in accordance with PennDOT Pub. 408, Sections 305, 320, & 400, as appropriate, and/or as otherwise set forth in Section 9.

c. Compacted Stone Aggregate

Compacted stone aggregate surfaces shall consist of the material specified in the drawing or Section 9. The material shall be moist and uniformly placed on the prepared base. The loose material shall be placed to an adequate thickness so that, when compacted, the finished thickness is as specified. The stone aggregate shall be compacted with a vibratory smooth wheeled roller to form a dense, smooth surface.

d. Other Materials and Structures

Surface treatments, such as wood chips, saw dust, coal combustion byproducts, soil cement, etc., shall be placed as set forth in Section 9, and to the grades and thicknesses shown on the drawings.

Structures including bridges, elevated walkways, fences, stairs, ramps, and trail side boards, shall be installed as shown on the drawings and/or as otherwise set forth in Section 9.

9. ADDITIONAL CONDITIONS WHICH APPLY TO THIS PROJECT ARE: